

Software Product Description

PRODUCT NAME: RSX-11M-PLUS, Version 2.1

SPD 14.70.10

DESCRIPTION

RSX-11M-PLUS is a disk-based, multiuser operating system that provides a multiprogramming environment using a priority structured, event-driven scheduler. It is a superset of the RSX-11M Operating System designed to maximize performance of large memory and general purpose PDP-11 processors.

RSX-11M-PLUS offers complete program development facilities as well as a real-time response, run-time system. Program development, real-time tasks, and batch streams can execute concurrently. The system's software priority levels enable the user to compile/assemble, debug, install and execute tasks, and run batch streams without significantly affecting real-time response. The system recognizes 250 software priority levels. The user-specified task priority determines the task's eligibility to execute. A task can be fixed in a partition to ensure immediate execution when activated or it can reside on disk while it is dormant, making memory available to other tasks. Task checkpointing enables tasks to be displaced from memory to enable higher priority, non-resident tasks to execute.

Memory sizes from 256K bytes up to 3840K bytes are supported. Memory is logically divided into partitions in which tasks are loaded and executed. The system controls the placement of tasks within a partition, and automatic memory compaction minimizes memory fragmentation within a partition.

A multiuser program development facility is provided. The traditional MCR command interface, the easy-to-use Digital Command Language (DCL) and user-written command interpreters are supported. LOGIN//LOGOUT with passwords, device access protection, a round-robin scheduler (running under the real-time executive), and concurrent execution of equal priority tasks via executive level swapping provide a time-sharing environment. In addition, accounting information is logged to a disk file, recording per user connect time, CPU time, and pages printed.

Tasks can be written in the supplied MACRO-11 assembly language or in optionally available languages,

such as FORTRAN-77, COBOL-81, DIBOL-83, PASCAL, and BASIC. User libraries and shareable libraries are supported. On 11/44 and 11/70 systems supervisor mode mapping can be used to map libraries, thus increasing the effective size of a user task. On 11/44 and 11/70 systems hardware mapping facilities are available to user tasks to separate instructions and data into separate 64KB address spaces, doubling the address space available to tasks with mixed instructions and data.

Tasks can be written so that the system will automatically load a single, reentrant code section of a multiuser task and an impure section for each additional invocation of the task.

An extensive set of utilities is provided to facilitate file and system maintenance, error analysis, and program debugging. Two editors, the RSX EDI line editor and EDT, the DEC standard text editor, are supplied.

The file system provides automatic space allocation and file structures for block structured devices. The system provides multiuser file protection, device independence, and logical device assignment. Sequential, random, and relative (RMS-11) file organizations are supported. Multikeyed Indexed Sequential Access Method (ISAM) files are supported with the supplied RMS-11 routines.

The use of The File Control Services (FCS) will increase the user-task size by approximately 2K to 8K bytes, depending on the number of open files and services desired. The Record Management System (RMS) requires at least 8K bytes per task.

A powerful, multistream BATCH facility is provided with RSX-11M indirect command file processing capabilities. The batch commands are in DCL or MCR format, making this capability easy to use. Status is returned to the batch processor as each step is completed, allowing for conditionalized branching. The batch processor collects all print files from a batch stream and spools them along with the log file. The queue manager provided gives the system manager control over the multiple batch streams and print queues.

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RL02 Distribution

A subset RSX-11M-PLUS system is provided on RL02 distribution. Most but not all device support and features are provided on the kit. Mass storage device support includes: RA60, RA80, RA81, RD51, RX02, RX50, RL01, RL02, TU58, TS11, TU80, AND TSV05.

The RL02 distribution is a single disk distribution that requires no system generation. The system is pregenerated to support:

- One MSCP RA60/80/81 or RX50/RD51 controller with four units
- One RL01/RL02 controller with four units
- One RX02 controller with two units
- One TU58 controller with two units
- One TS11 controller with one unit
- A single line printer
- The Laboratory Peripherals Accelerator, Industrial Control Subsystem, and K-series devices
- Error logging

For the 11/44 and 11/70 processors supporting separate Instruction and Data spaces, a pregenerated system is provided that utilizes these features. A non I and D space system which does not support Supervisor mode is provided for the Micro/PDP-11, the 11/23-Plus, and the 11/24. An automated procedure deletes one of the pregenerated systems if it is not required in order to recover some disk space.

Features

- Overlapped, disk seek support for RK06/07, RA60/80/81, RP04/05/06, RM02/03/05/80 disks
- Request queue optimization, which reduces average seek times on disks
- Dynamic dual pathing support for RK06/07, RP04/05/06, and RM02/03/05/80 disks
- Software addressing of up to 256 terminals
- Complete upward compatibility for nonprivileged tasks with RSX-11M-PLUS, Version 2.0, RSX-11M Versions, 4.0 and 4.1. Task rebuilding is not required.
- Shadowed disk support, which allows one of two disks of the same type to be designated as a shadowed backup of the other mounted as a Files-11 volume. All writes to the primary drive are automatically written to the secondary. In the event of a read failure on the primary drive, the system will automatically read the data from the secondary drive.
- Powerful restart, which allows the system to continue executing upon power restoration, restarting all interrupted I/O activities and notifying any active task through a powerfail asynchronous system trap entry point.
- Host for RSX-11S program development and system building
- Error logging capabilities

SOURCE CODE INFORMATION

Source code modules for the RSX-11M-PLUS Executive and privileged code are provided with binary single-use license options on 800 BPI Magtape, 1600 BPI Magtape and RK07 Disk Cartridge in order to generate an RSX-11M-PLUS system customized for the user via sysgen. Sources are not available on the RL02 distribution kit.

This source code is provided on a "**AS IS**" basis without any warranty of any kind either express or implied.

MINIMUM HARDWARE REQUIRED*For System Generation:*

Processor: PDP-11/23-PLUS, PDP-11/24, 11/44 or 11/70 Console Terminal: LA34, LA36, LA38, VT52, VT100, VT101, VT102, LA120, VT220 and VT240

NOTE: Console baud rates must not exceed 1200 baud

Clock: KW11-L, KW11-P, DL11-W or equivalent

Memory: 256K bytes, KT24 for 11/24

Disk: RA60/80/81, RP04/05/06, RM02/03/05/80 or dual RK07

Tape: For all RA60/80/81, RM02/03/05/80 and RP04/05/06 systems, a 9-track tape drive from the optional hardware list is required.

For System Execution

Processor: PDP-11/23-PLUS, Micro/PDP-11, 11/24, 11/44 or 11/70

Console Terminal: LA34, LA36, LA38, VT52, VT100, VT101, VT102 or LA120

Clock: KW11-L, KW11-P, DL11-W or equivalent

Memory: 256K bytes, KT24 for 11/24

Disk: RL01/02, RK06/07, RA60/80/81, RM02/03/05/80 or RP04/05/06

For RL02 Distribution

Processor: PDP-11/23-PLUS, Micro/PDP-11, 11/24, 11/44 or 11/70

Console Terminal: LA34, LA36, LA38, VT52, VT100, VT101, VT102, VT220, VT240, or LA120

NOTE: Console baud rates must not exceed 1200 baud.

Clock: KW11-L, KW11-P, DL11-W or equivalent

Memory: 256K bytes KT24 for 11/24

Disk: Dual RL02

Maximum Configuration for RL02 Distribution

Processor: PDP-11/23-PLUS, Micro/PDP-11, 11/24, 11/44 or 11/70

Console Terminal: LA34, LA36, LA38, VT52, VT100, VT101, VT102, VT220, VT240 or LA120

Clock: KW11-L, DL11-W or equivalent

Memory: 3840K bytes, KT24 for 11/24

Disk: Four RL01/02, one RX211

Terminals: Up to 64 lines using DL or DZ controllers with a maximum of 16 controllers

Printer: One LP11 or equivalent

Tape: Two TU58, one TS11, TSV05

Laboratory Peripherals: K-Series devices, LPA-11, IP-11

Floating Point Processors: FP11, KEF11-AA, FPF11

NOTE: The RL02 distribution does not include a system generation capability. However, loadable driver support is included so that customers can write their own device drivers.

OPTIONAL HARDWARE

NOTE: In some cases, not all hardware features of the following options are supported. Hardware restrictions can limit the number of devices that a system can support.

- Additional memory up to a maximum of 3840K bytes
- FP11 Floating Point Processor
- KEF11-AA Floating Point Processor
- FPF11 Floating Point Processor

I/O Peripherals

- PR11 paper tape reader or PC11 paper tape reader/punch
- CR11 or CM11 card reader
- LA35, LA180, LS11, LP11, or LV11 line printer (no plotter support)
- LP27 with LP11 interface

9-Track Magnetic Tape Drives

- TU10, TU10W, TE10 800 BPI tape drives
- TU16, TE16, TU45, TU77 800/1600 BPI tape drives
- TS11 1600 BPI tape drive
- TSV05
- TU80

Other Magnetic Tape Devices

- TU56 DECTape
- TU58 DECTape II Cartridge

NOTE: The TU58 should be used only in a stand-alone, lightly loaded environment. If used as a file device in a heavily loaded environment, it can degrade system performance.

Hard Disk Devices

- RK11 disk cartridge controller with RK05J and/or RK05F disk drives
- RL11 or RLV12 disk cartridge controller with RL01 or RL02 disk drives
- RK611 or RK711 disk cartridge controllers with RK06 or RK07 disk drives
- RP04, RP05, or RP06 disk pack drives (with appropriate controller)
- RM02/03/05 disk pack drives (with appropriate controller)
- RM80 disk drive (with RH70 controller)
- RS03 or RS04 fixed head disks (with appropriate controller)
- ML11 semiconductor disk emulator (with appropriate controller)
- RA60/80/81 disk drive (with UDA50 controller)
- RQDX1/RD51 disk drive

NOTE: Due to hardware restrictions, DMA devices with the exception of the RLV12 are not supported on 11/23-PLUS systems. This includes the RXV21 RX02 controller.

Soft Disk Devices

- RX11 and RX211 floppy disk systems
- RQDX1/RX50 floppy disk system

Terminals

- LA34, LA36, LA38, LA180S, LA120, VT52, VT55, VT100, VT101, VT102, VT125, and VT20, VT240 terminals. These terminals are supported when interfaced using DH1 (with or without DM11-BB) DZ11, DZV11, DJ11, DL11-A, B, C, D, E, or W, or DLV11.
- The PC100 is supported as a terminal in VT102 mode
- The PC278 (DECmate-II) is supported as a terminal in VT102 mode
- The PR0 350 is supported as a VT102/VT125 in emulation mode

Note: A maximum of 256 terminals is supported

- RT02 Alphanumeric Display
- RT02-C Alphanumeric Display and Badge Reader

Communications (QIO Interface)

- DMC11
- DMR11
- PCL-11B
- DUP-11
- DZS11

Laboratory/Industrial Control

- LPA11-K Laboratory Peripheral Accelerator
- IP11 and IPV11 Process Control Subsystems
- Laboratory I/O Subsystem configured using the following options:

ADK11-KT 12-bit A/D converter with 16-channel multiplexer; one per subsystem

AD11-K 12-bit A/D converter with 16-channel multiplexer, 16 per subsystem (15 if ADK11-KT is part of same subsystem)

KW11-K Dual real-time clock with Schmitt triggers; one per subsystem (clock already included in ADK11-KT, no KW11-K required if one is present)

AM11-K 48 channel A/D multiplexer with gain ranging; one per AD11-K or ADK11-KT

DR11-K 16 bit digital I/O option: 16 per subsystem

- AA11-K 4-channel 12 bit D/A converter with scope control; 16 per subsystem

AAV11-A, ADV11-A, KVV11-A, and DRV11 realtime options

PREREQUISITE SOFTWARE

None

OPTIONAL SOFTWARE

Refer to the RSX-11M-PLUS Optional Software Cross Reference Table (20.99.xx) for optional software.

SOFTWARE WARRANTY

Warranty for this software product is provided by DIGITAL with the purchase of a license for the product. There is no additional charge. This software product is warranted to conform to the Software Product Description (SPD). This means that DIGITAL will remedy any nonconformance when it is reported to DIGITAL by the customer during the warranty period.

The warranty period is ninety (90) days. It begins when the software is installed or thirty (30) days after delivery to the end user, whichever occurs first and expires ninety (90) days later. All warranty related support for this software will end 180 days after release of the subsequent version.

Warranty is provided in the country of purchase. DIGITAL will provide a service location which will accept reporting (in a format prescribed by DIGITAL) of a nonconformance problem caused when using the licensed software under normal conditions as defined by the SPD. DIGITAL will remedy a nonconformance problem in the current unaltered release of the licensed software by issuing correction information such as: correction documentation, corrected code, or notice of availability of corrected code; or a restriction or a bypass. The customer will be responsible for the preparation and submission of the problem report to the service location.

Warranty Exclusion

DIGITAL DOES NOT WARRANT THAT THE SOFTWARE LICENSED TO CUSTOMER SHALL BE ERROR FREE, THAT THE SOFTWARE SHALL OPERATE WITH ANY HARDWARE AND SOFTWARE OTHER THAN AS SPECIFIED IN THIS SPD, THAT THE SOFTWARE SHALL SATISFY CUSTOMER'S OWN SPECIFIC REQUIREMENTS, OR THAT COPIES OF THE SOFTWARE OTHER THAN THOSE PROVIDED OR AUTHORIZED BY DIGITAL SHALL CONFORM TO THE SPD.

DIGITAL MAKES NO WARRANTIES WITH RESPECT TO THE FITNESS AND OPERABILITY OF MODIFICATIONS NOT MADE BY DIGITAL.

IF THE SOFTWARE FAILS TO FUNCTION FOR REASONS STATED ABOVE, THE CUSTOMER'S WARRANTY WILL BE INVALIDATED AND ALL SERVICE CALLS WILL BE BILLABLE AT THE PREVAILING PER CALL RATES.

INSTALLATION

Only experienced customers should attempt installation of this product. DIGITAL recommends that all other customers purchase DIGITAL's Installation Services. These services provide for installation of the software product by an experienced DIGITAL Software Specialist.

DIGITAL's Installation Services can be purchased as part of a Packaged Service Option or bought separately.

ORDERING INFORMATION

Single-Use licensed software is furnished under the licensing provisions of DIGITAL's Standard Terms and Conditions of Sale, which provide in part that the software and any part thereof may be used on only the single CPU on which the software is first installed, and may be copied, in whole or in part (with the proper inclusion of DIGITAL's copyright notice and any proprietary notices on the software) for use on such CPU.

You will need a separate license for each CPU on which you will be using the software product (except as otherwise specified by DIGITAL). Then you will select the Materials and Service Options you need to utilize the product effectively. You can order these options individually. But, to ensure that you get the set of services you need and to simplify ordering, DIGITAL offers Startup Service Packages designed for your environment and experience level. **IF YOU ARE ALREADY FAMILIAR WITH THESE OPTIONS, YOU MAY OBTAIN THE ORDERING INFORMATION DIRECTLY FROM THE SOFTWARE OPTIONS CHART.** In most cases, you will want to review the following descriptions to determine what options you require.

LICENSE OPTIONS**Single-Use License Option**

The Single-Use License is your right to use the software product on a single CPU and it includes your 90 day warranty.

For your first installation of this software product you must purchase as a **minimum**:

- Single-Use License Option, and
- Distribution and Documentation Option

The license gives you the right to use the software on a single CPU and the Distribution and Documentation Option provides the machine-readable software and related documentation.

To use this software product on additional CPUs, you must purchase for each CPU as a **minimum**:

- Single-Use License Option

In addition to the right to use, the license gives you the one-time right to copy the software from your original CPU installation to the additional CPU. Therefore, the Distribution and Documentation Option is not required, but optional.

PDP-11 Operating System General License Option

The PDP-11 Operating System General License option is a package of single-use licenses which are your right-to-use all of the following operating systems on a single CPU:

Micro/RSTS, Micro/RXS, RT-11, RSX-11M, RSX-11S, RSX-11M-PLUS, DSM-11, RSTS/E, CTS 300

The General License option provides all the Single-Use License rights described above for each software product except it includes a 90 day warranty only for the first software product to be installed.

You purchase a General License option according to the category to which your CPU belongs. The categories are listed below.

QJB36-UZ	DCT11 Microprocessor Chip
QJB39-UZ	DCF11 Microprocessor Chip
QJB43-UZ	DCJ11 Microprocessor Chip
QJB46-UZ	KD11, KDF11 CPU Modules
QJB51-UZ	11C23 MICRO/PDP-11 Models and Systems
QJB56-UZ	11/03 through 11/23-Plus Models and Systems
QJB66-UZ	11/24 through 11/40 Models and Systems
QJB76-UZ	11/44 through 11/70 Models and Systems

For the first installation of this software product you must as a **minimum**:

- have, or purchase a General License Option, and
- Distribution and Documentation Option

To use this software product on additional CPUs, you must as a **minimum**:

- have, or purchase a General License Option for each CPU

Migration Option

Current licensed users of RSX-11M, RSX-11D or IAS are eligible for the migration option. This is a Single-Use License offered at a reduced price and provides all of the License rights described above.

For your first installation of this software product you must purchase as a **minimum**:

- Migration Option, and
- Distribution and Documentation Option

To use this software product on additional CPUs currently licensed for RSX-11M, RSX-11D or IAS, you must purchase for each CPU as a **minimum**:

- Migration Option

MATERIALS AND SERVICE OPTIONS

Startup Service Packages

To meet the first year software support needs of your new computer system, DIGITAL offers comprehensive Startup Service Packages. For a fixed price, each Package includes the distribution media, documentation and one year of software service for this product and all concurrently purchased qualified DIGITAL dependent products. Additional service components, such as: installation, orientation and training, are included at various Package levels.

For more information on what is included in each Startup Service Package level, please obtain the appropriate Service Description from your local DIGITAL Office.

Distribution and Documentation Option

The Distribution and Documentation option provides the machine-readable software in binary form and the basic documentation. You must have, or order, a Single-Use License to obtain this option. You will need this option to install the software for the first time. When revised versions of this software product become available, they may also be obtained by purchasing this option again.

If you prefer to receive automatic distribution of revised versions for this product, you must purchase a Software Product Service Agreement.

Software Revision Right-To-Copy Option

The Right-To-Copy Option allows a customer with multiple CPUs to copy a revised version of a software product from one CPU to another. Each CPU must be licensed for that product. You first install the revised software on one CPU; then you can make copies for additional CPUs by purchasing the Right-To-Copy Option for each additional CPU.

If you prefer to automatically obtain the right-to-copy, you must purchase a Service Right-to-Copy for each additional CPU; this is a service added to a Software Product Service Agreement.

Documentation-Only Option

You can obtain one copy of the basic documentation by purchasing the Documentation-Only Option.

Installation Service Option

DIGITAL's Installation Service is provided by a DIGITAL Software Specialist and accelerates your productive use of this product. For more information on what is included in this service, please obtain the appropriate Service Description from your local DIGITAL office.

Software Product Service Agreements

DIGITAL offers licensed customers annual Software Product Service Agreements to maintain their software:

DECsupport Service is the most comprehensive level of service offering critical problem on-site assistance and scheduled preventative maintenance. You receive telephone support that gives you timely answers and solves most software problems. In addition, you get revised versions of the software and documentation, and system newsletters or dispatches.

BASIC Service is ideal for customers who have a staff who's experience and expertise enables them to analyze and communicate a software problem to DIGITAL remote support centers. You receive telephone support that gives you timely answers and solves most software problems. In addition, you get revised versions of the software and documentation, and system newsletters or dispatches.

Self-Maintenance Service is designed for customers who require revised versions of the software and documentation from DIGITAL. In addition, you get system newsletters or dispatches and may submit software performance questions.

A variety of service options may be added to an existing Software Product Service Agreement, such as service for multiple-like systems. Contact your DIGITAL representative for additional information and ordering details.

For more information on what is included in these agreements, please obtain the appropriate Service Description from your local DIGITAL office.

Training From Educational Services

To ensure customer success with DIGITAL products, Educational Services sells training for the installation, maintenance and/or management of DIGITAL software. Course formats vary from seminars to packaged training materials that include self-paced instruction and computer-based instruction to traditional lecture/labs at DIGITAL's worldwide Training Centers.

For a complete listing of course schedules and prices, refer to the *DIGEST*, Educational Services' quarterly publication. For curriculum-specific information, training recommendations and assistance in planning training programs, please contact your Educational Services Representative.

Professional Software Services

DIGITAL Software Specialists are available on a per-call or resident contract basis to help in all phases of software development or implementation. Specialists are available to serve as technical consultants, decision support consultants or business systems analysts. Resources are available to:

- Supplement your programming staff
- Assume project management responsibility
- Develop software
- Augment a system start-up service package with tailored services to meet specific needs

Contact your DIGITAL representative for additional information and ordering details.

SOURCE MATERIALS OPTIONS

You can obtain optional source materials for this software product by signing DIGITAL's Software Program Sources License Agreement and then purchasing the source option(s) you want. The agreement entitles you to use the source materials at one customer facility or location which is specified in the agreement.

Most users do not require source materials. They are used primarily to make modifications to the software product. Source kits provided by DIGITAL do not necessarily contain all source files used by DIGITAL to build binary kits.

Source License and Sources Distribution Option

This option provides you with the machine-readable source code for this software product. It gives you the right to use the source code on any CPU at the facility/location specified in the agreement which has a Single-Use License for the object code.

Source License and Sources Listings Option

This option provides you with listings of the source programs for this software product. It gives you the right to use the listings for any CPU at the facility/location specified in the agreement which has a Single-Use License for the object code.

Sources Distribution Option

This option provides you with the revised version of the machine-readable source code for this software product.

Sources Listings Option

This option provides you with listings of source code for the revised version of the software product.

SOFTWARE OPTIONS CHART

The distribution Media Codes used in the Software Options Chart are described below. You specify the desired Media Code at the end of the Order Number, e.g., QR500-HD = binaries on 9-track 800 BPI Magtape (NRZI).

D = 9-track 800 BPI Magtape (NRZI)

H = RL02 Disk Cartridge

M = 9-track 1600 BPI Magtape (PE)

R = Microfiche

V = RK07 Disk Cartridge

Z = No hardware dependency

NOTE: The availability of these software product options and services may vary by country. Customers should contact their local DIGITAL office for information on availability.

OPTIONS	ORDER NUMBER FOR RK07,RA60/ 80/81, RM02/03/ 05/80 and RP04/ 05/06/07 BASED SYSTEMS	ORDER NUMBER FOR RL02 BASED SYSTEMS
LICENSE OPTIONS: A LICENSE IS REQUIRED FOR EACH CPU.		
Single-Use License	QR500-UZ	QR503-UZ
PDP-11 Operating System General License*	QJBxx-UZ*	QJBxx-UZ*
	QR510-UZ	QR513-UZ
MATERIALS AND SERVICE OPTIONS:		
Package Service Options:		
Start-Up Service Package, Level III	QR500-BD QR500-BM QR500-BV	QR503-BH
Start-Up Service Package, Level II	QR500-7D QR500-7M QR500-7V	QR503-7H
Start-Up Service Package, Level I	QR500-5D QR500-5M QR500-5V	QR503-5H
Distribution and Documentation Option	QR500-HD QR500-HM QR500-HV	QR503-HH
Software Revision Right-To-Copy Option	QR500-HZ	QR503-HZ
Documentation Only Option	QR500-GZ	QR503-GZ
Installation Service Option	QR500-ID QR500-IM QR500-IV	QR503-IH

SOFTWARE OPTIONS CHART (Continued)

OPTIONS	ORDER NUMBER FOR RK07,RA60/ 80/81, RM02/03/ 05/80 and RP04/ 05/06/07 BASED SYSTEMS	ORDER NUMBER FOR RL02 BASED SYSTEMS
Software Product Service Agreements:		
DECsupport Service	QR500-9D QR500-9M QR500-9V	QR503-9H
Basic Service	QR500-8D QR500-8M QR500-8V	QR503-8H
Self-Maintenance Service	QR500-3D QR500-3M QR500-3V	QR503-3H
SOURCE AND MATERIALS OPTIONS:		
Source License and Sources Distribution	QR520-ED QR520-EM	QR520-ED QR520-EM
Source License and Sources Listings	QR520-FR	QR520-FR
Source License and Sources Listings ** for Executive and I/O Device Driver	QR500-FR	QR500-FR
Sources Distribution	QR520-ND QR520-NM	QR520-ND QR520-NM
Sources Listings	QR520-NR	QR520-NR
Sources Listings for Executive and I/O Device Driver	QR500-NR	QR500-NR

** The combination of Executive and Utilities sources does not necessarily comprise all the sources used by DIGITAL to build the binary kits.